AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for estimating a systematic relationship between a plurality of points, comprising:

~~obtaining~~ receiving a signal comprising coordinate data and normal vector data associated with each point of a starting set of points from a measuring device, where the starting set comprises at least three non-linear points;

determining a first estimated relationship between the plurality of points based on the coordinate data and the normal vector data associated with the starting set of points;

determining a target point corresponding to a point having a maximum estimated error within the first estimated relationship between the plurality of points; and

obtaining coordinate data and normal vector data for the target point if the maximum estimated error is greater than a predetermined error limit.

2. (Cancelled)

3. (Original) The method of claim 1, where the starting set further comprises points defining a boundary of the plurality of points.

4. (Original) The method of claim 1, where determining the first estimated relationship between the plurality of points further comprises interpolating between the starting set of points according to a predetermined estimator that incorporates the obtained coordinate data and the obtained normal vector data and generates estimated coordinate data and estimated normal vector data.

5. (Original) The method of claim 4, where the predetermined estimator comprises a function for representing a multi-dimensional relationship.

6. (Original) The method of claim 4, where the predetermined estimator comprises a cubic spline function.

7. (Previously Presented) The method of claim 1, where determining the target point further comprises comparing the first estimated relationship between the plurality of points to a reference relationship between the plurality of points to determine a difference defining an error relationship between the plurality of points, where the reference relationship between the plurality of points comprises a plurality of points having reference coordinate data and reference normal vector data, where the error relationship between the plurality of points comprises a plurality of points having coordinate data error and normal vector data error, and where the maximum estimated error corresponds to the maximum absolute value of the coordinate data error or the normal vector data error.

8. (Original) The method of claim 7, where the reference relationship between the plurality of points comprises a plurality of points having predetermined values.

9. (Original) The method of claim 8, where the predetermined values define the relationship between the plurality of points according to predetermined standards.

10. (Original) The method of claim 8, where the predetermined values are zero.

11. (Previously Presented) The method of claim 1, where the predetermined error limit corresponds to a predetermined level of accuracy.

12. (Previously Presented) The method of claim 1, further comprising:

obtaining coordinate data and normal vector data for each point of a second set of points if the maximum estimated error is greater than the predetermined error limit; and

determining a second estimated relationship between the plurality of points representative of a subset of the plurality of points based on the second set of coordinate data and the second set of normal vector data.

13. (Original) The method of claim 12, where the second set comprises at least the target point and two of the three points of the starting set.

14. (Original) The method of claim 12, further comprising:

determining a new target point corresponding to a new maximum estimated error within the second estimated relationship between the plurality of points; and

obtaining coordinate data and normal vector data for the new target point if the new maximum estimated error is greater than the predetermined error limit.

15. (Original) The method of claim 1, further comprising removing data associated with the first estimated relationship between the plurality of points based on the normal vector data.

16. (Currently Amended) A method for estimating a relationship between a plurality of points, comprising:

generating a first estimated relationship between the plurality of points based on measured coordinate data and normal vector data received from a measuring device, the measured coordinate data comprising a measured value of a vector associated with a point corresponding to a given one of the plurality of points, the normal vector data representative of a local rate of change with respect to the vector associated with the given one of the plurality of points, the first estimated relationship between the plurality of points derived from estimated normal vector data corresponding to at least a portion of the plurality of points; and

automatically determining whether further measurements are required based on the estimated normal vector data in combination with predetermined measurement criteria comprising error limitations.

17. (Original) The method of claim 16, where generating the first estimated relationship between the plurality of points further comprises:

generating coordinate data error and normal vector data error respectively corresponding to the measured coordinate data and the normal vector data; and

generating the first estimated relationship between the plurality of points according to a predetermined estimation function and based on the coordinate data error and the normal vector data error.

18. (Previously Presented) The method of claim 16, where the predetermined measurement criteria comprise criteria selected from the group consisting of physical limitations and rule-based criteria.

19. (Currently Amended) A method of estimating a relationship between a plurality of points, comprising:

removing data from a plurality of coordinate data and normal vector data associated with measured points received from a measuring device, the measured points defining a starting set associated with the plurality of points based on estimated normal vector data associated with the measured points, thereby defining a revised starting set, wherein the data is removed based on error limitations; and

generating a first estimated relationship between the plurality of points based on the coordinate data and the normal vector data of the revised starting set, the coordinate data comprising a measured value of a vector associated with a point corresponding to a given one of the plurality of points, the normal vector data comprising a the local rate of change associated with the vector of the given one of the plurality of points, the first estimated relationship between the plurality of points derived from estimated normal vector data corresponding to at least a portion of the plurality of points.

20. (Cancelled)

21. (Previously Presented) A computer readable medium for estimating a systematic relationship between a plurality of points, comprising:

an estimation module having a predetermined estimation function operative to generate a first estimated systematic relationship between the plurality of points based on coordinate data and normal vector data, the coordinate data comprising a measured value of a vector corresponding to a given one of the plurality of points, the , the first estimated

systematic relationship between the plurality of points derived from estimated normal vector data corresponding to at least a portion of the plurality of points; and

an adaptive sampling module operative to automatically determine whether further measurements are required based on the estimated normal vector data in combination with predetermined measurement criteria comprising error limitations.

22. (Original) The computer-readable medium of claim 21, where the predetermined estimation function comprises a function for representing a multi-dimensional relationship.

23. (Previously Presented) The computer-readable medium of claim 21, where the predetermined measurement criteria comprise criteria selected from the group consisting of physical limitations and rule-based criteria.

24. (Previously Presented) A system for estimating a systematic relationship between a plurality of points, comprising:

an estimator having an estimation function operable for determining a first estimated systematic relationship between the plurality of points, the first estimated systematic relationship between the plurality of points having coordinate data and normal vector data determined from a starting set of measured points associated with the plurality of points;

wherein the coordinate data comprise a value of a vector associated with the plurality of points;

wherein the normal vector data comprise a value of a local rate of change of the vector associated with the plurality of points; and

wherein the estimator further comprises reference coordinate data and reference normal vector data respectively corresponding to a reference systematic relationship between the plurality of points, the reference systematic relationship between the plurality of points representing a known systematic relationship between the plurality of points, the estimator further comprising coordinate data error and normal vector data error, the coordinate data error representing a difference between the coordinate data and

the reference coordinate data and the normal vector data error representing a difference between the normal vector data and the reference normal vector data, wherein the first estimated systematic relationship between the plurality of points is determined based on the coordinate data error and normal vector data error.

25. (Cancelled)

26. (Original) The system of claim 24, further comprising an adaptive sampling mechanism having predetermined measurement criteria, wherein the adaptive sampling mechanism is operative to generate a measurement decision based on an evaluation of the coordinate data and the normal vector data with respect to the predetermined measurement criteria.

27. (Original) The system of claim 24, wherein the predetermined measurement criteria comprise criteria selected from the group consisting of physical limitations, error limitations, and rule-based criteria.

28. (Original) The system of claim 24, wherein the estimation function comprises a function for representing a multi-dimensional relationship.

29. (Original) The system of claim 26, where the estimation function comprises a cubic spline function.

30. (Original) A system for estimating a systematic relationship between a plurality of points, comprising:

an estimator comprising a first program operable for receiving coordinate data and normal vector data associated with each of a starting set associated with the plurality of points, wherein the starting set comprises at least three non-linear points, the estimator further comprising a first estimated systematic relationship between the plurality of points and a predetermined estimation function, the first estimated systematic relationship between the plurality of points comprising estimated coordinate data and estimated

normal vector data representative of an estimate of the systematic relationship between the plurality of points and generated by the predetermined estimation function based on the coordinate data and the normal vector data; and

an adaptive sampling mechanism operative on a systematic relationship error representative of a difference between the first estimated systematic relationship and a reference systematic relationship, wherein the reference systematic relationship comprises reference coordinate data and reference normal vector data each having desired values associated with the plurality of points, wherein the systematic relationship error comprises a plurality of points corresponding to the reference systematic relationship and having coordinate data error and normal vector data error, the adaptive sampling mechanism further operative to generate a target point and further comprising a predetermined error limit, the target point corresponding to a point having a maximum estimated error within the systematic relationship error and the predetermined error limit comprising a value determinative of an acceptability of the systematic relationship error.

31. (Cancelled)

32. (New) The method of claim 1, wherein the measuring device comprises a coordinate measurement machine (CMM).

33. (New) The method of claim 1, wherein the measuring device comprises an oscilloscope.

34. (New) The method of claim 1, wherein the measuring device comprises a laser measurement device.

35. (New) The method of claim 1, wherein the measuring device comprises an optical measurement device.